SOME ASPECTS OF THE NESTING REQUIREMENTS OF COMMON LOONS IN ALBERTA

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Henderson (1924) reported on the preference of Common Loons (*Gavia immer*) for a nesting site on some point or small island in Alberta, while Munro (1945) discussed nest-site location in relation to vegetation cover and access of water. The purpose of this study was to obtain further information on nesting requirements of loons in western Canada. Particular attention was paid to the effects of human disturbance on loons.

A survey of breeding loons was conducted on 19 lakes in east-central Alberta in 1972 (Fig. 1). All lakes surveyed were eutrophic and were located within the boreal mixed woods. Balsam poplar (*Populus balsamifera*) and aspen poplar (*Populus tremuloides*) were found to be the most dominant trees in this lake region, while white spruce (*Picea glauca*), black spruce (*Picea mariana*), jack pine (*Pinus banksiana*) and white birch (*Betula papyrifera*) were also very common.

White-winged Scoters (*Melanitta deglandi*), Lesser Scaup (*Aythya affinis*), Common Goldeneyes (*Bucephala clangula*), Mallards (*Anas platyrhynchos*), and American Widgeon (*Anas americana*) were the most common nesting ducks and the Red-necked Grebe (*Podiceps grisegena*) the most frequently encountered grebe. Lower Therien Lake had nesting colonies of Common Terns (*Sterna hirundo*), California Gulls (*Larus californicus*) and Double-crested Cormorants (*Phalacrocorax auritus*). Common Tern colonies were also observed on Ironwood Lake and Lac Saint Cyr. Great Blue Herons (*Ardea herodias*) nested on treed islands at Lower Mann, Island, and Frenchman lakes.

METHODS

Inasmuch as loons were not observed on 20 sloughs and shallow lakes in the study region, the study was limited to lakes utilized by sport fisherman, as an indication of there being fish present as food for loons. To further facilitate the study, only lakes accessible by road and up to 3000 acres in size were surveyed.

The survey was conducted with a 12 foot long aluminium boat, equipped with a 9½ h.p. outboard engine. Lakes on which no breeding pairs were observed, were checked twice during May and June. Lakes with breeding pairs were checked four to five times during May, June, the first half of July and the last week of August to obtain data on breeding success, which will be reported on later. Shorelines were cruised, with frequent 15-minute stops, for the purpose of detecting loons. The circumference of all islands, smaller than 30 acres, was checked for nests by walking along the shore. Where dense brush and logs made walking difficult, the shoreline was investigated by wading in water

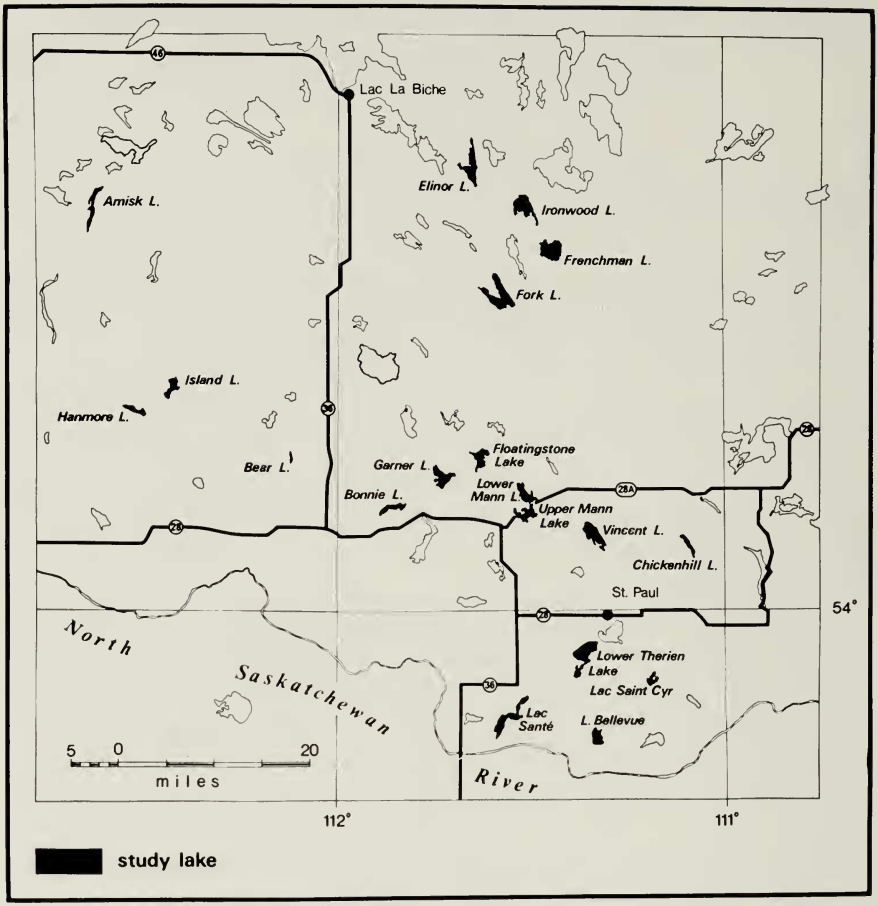

FIG. 1. Location of lakes surveyed for breeding pairs of Common Loons in Alberta.

parallel to the shore. Points and peninsulas along the shore of the mainland and islands, larger than 30 acres, were examined on foot for nests when loons were sighted in the vicinity. The checks in May and June lasted from 2 to 8 hours depending on the number of islands present and the size of the lake investigated. After being familiar with most of the nesting locations, subsequent checks took less time.

Human disturbance occurring at each lake was compared with the number of breeding pairs of loons there. Inasmuch as it was impossible to directly measure the amount of disturbance, an indication of disturbance for each lake was calculated from the number of campsites, resorts and cottages on its shores. Ten disturbance units were given to each government campsite and resort and one disturbance unit for each house and summer cottage bordering a lake. The total number of disturbance units calculated for each lake were divided by the lake acreage to obtain a disturbance ratio (Table 1).

TABLE 1

CALCULATED DISTURBANCE RATIOS OF LAKES SURVEYED FOR BREEDING COMMON LOONS

Name of Lake	Number of government campsites and resorts	Number of homes, summer cottages	Total number of disturbance units	Lake size in acres	Disturbance ratios: Disturbance units/lake size
Amisk Lake	1	11	21	1206	0.0174
Bear Lake	0	0	0	161	0.0000
Bonnie Lake	1	3	13	916	0.0142
Chickenhill Lake	0	3	3	676	0.0044
Elinor Lake	0	2	2	2397	0.0008
Floatingstone Lake	3	20	50	1281	0.0390
Fork Lake	2	7	27	3038	0.0089
Frenchman Lake	0	1	1	2224	0.0004
Garner Lake	2	14	34	1677	0.0203
Hanmore Lake	1	20	30	624	0.0481
Island Lake	0	8	8	1005	0.0080
Ironwood Lake	1	2	12	2027	0.0059
Lac Bellevue	1*	2	3	1107	0.0027
Lac Santé	1	5	15	2478	0.0061
Lac St. Cyr	1	14	24	611	0.0393
Lower Mann Lake	2	15	35	1164	0.0301
Lower Therien Lake	1	0	10	2840	0.0035
St. Vincent Lake	3	68	98	1604	0.0611
Upper Mann Lake	2	10	30	1199	0.0250

* Unused campsite because of flooding.

RESULTS

Nest Sites.—Thirty-three breeding pairs of loons were observed on the surveyed lakes. The nests of 26 pairs were found. Four pairs of those whose nests were not found were seen with broods and three pairs were thought to be breeders because of their occupation of the same localities and their vocalized reaction (yodeling and tremolo calls) each time the boat entered their territories. Twenty-five nests were found on islands and one on the mainland. Twenty-two of the nesting islands were wooded and three were without trees. Common Terns nested on two and California Gulls and Double-crested Cormorants on one of the treeless islands. Ducks and grebes shared many of the nesting islands with the loons.

Most loon nests were situated directly on the water's edge and none was more than four feet away from a lake (Table 2). Of two nests completely surrounded by water half a foot deep, one was situated in a submerged area of sedges (*Carex* sp.) and 60 feet from an island. The other nest was without surrounding vegetation built upon a platform in one foot of water and 15 feet

Table 2
Nest Location of Common Loons in Relation to Nearness of Water

Distance of nest rim to water, in feet	Number of nests
0	15
0.1–1.0	6
1.1–2.0	2
2.1–3.0	1
3.1–4.0	2

from an insular shore. Four of the 26 nests were situated on muskeg and the other 22 on a firmer substrate of sand, clay and rock boulders. The three most frequent plant species bordering the nests were sedges (15 times), willows (*Salix* spp., six times) and balsam poplars (six times). Twenty nests were sheltered in a bay or by a nearby island and six nests faced a large expanse of water. In 25 cases the nest site was located in such a manner as to afford a good underwater exit for the breeding loon. But at one site, the nesting loon had to swim through half a foot of water for 15 feet, over a lake bottom strewn with boulders, to reach deeper water. Nineteen of the 25 insular nests were situated on islands less than two acres in size (Table 3). However, there was no statistically significant preference of loons to nest on islands smaller than two acres. Amisk Lake, Bear Lake and Lac Bellevue were excluded from the statistical comparison because of one size category of nesting islands at those lakes.

Table 3
Relation between Size of Nesting Islands and that of the Total Number of Islands (between Brackets) on Lakes with Nesting Common Loons

Lakes	Size of nesting islands in acres	
	0–2.0	>2.0
Amisk Lake		1 (1)
Bear Lake	1 (1)	
Elinor Lake	4 (10)	1 (4)
Fork Lake	2 (6)	2 (7)
Frenchman Lake	2 (3)	0 (2)
Island Lake	5 (25)	1 (5)
Ironwood Lake	2 (4)	0 (1)
Lac Bellevue	1 (2)	
Lower Therien Lake	2 (4)	1 (8)
Total	19 (55)	6 (28)

TABLE 4

COMPARISON OF NUMBER OF BREEDING PAIRS OF COMMON LOONS WITH LAKE SIZE, NUMBER OF LAKE ISLANDS AND DISTURBANCE RATIOS

Name of Lake	Number of breeding pairs	Lake size, in acres	Number of islands	Disturbance ratios
Amisk Lake	2	1206	1	0.0174
Bear Lake	2	161	1	0.0000
Bonnie Lake	1	916	3	0.0142
Chickenhill Lake	0	676	0	0.0044
Elinor Lake	5	2397	14	0.0008
Floatingstone Lake	0	1281	2	0.0390
Fork Lake	5	3038	13	0.0089
Frenchman Lake	3	2224	5	0.0004
Garner Lake	0	1677	0	0.0203
Hanmore Lake	0	624	0	0.0481
Island Lake	7	1005	30	0.0080
Ironwood Lake	2	2027	5	0.0059
Lac Bellevue	3	1107	2	0.0027
Lac Santé	0	2478	3	0.0061
Lac St. Cyr	0	611	2	0.0393
Lower Mann Lake	0	1164	12	0.0301
Lower Therien Lake	3	2840	12	0.0035
St. Vincent Lake	0	1604	0	0.0611
Upper Mann Lake	0	1199	7	0.0250

Breeding Pairs Versus Lake Parameters.—No loons were observed on 20 sloughs and shallow lakes which were checked in the study region. Loons were observed on all of the 19 fishing lakes, but breeding pairs were encountered on only 10 of those lakes. To determine why loons nest at certain lakes and not at others, the number of breeding pairs of loons was compared with size, number of islands and the disturbance ratio of each lake (Table 4). No significant correlation was found between the number of breeding pairs of loons and lake size ($r = 0.36$). There was a positive and significant correlation between numbers of breeding pairs and islands ($r = 0.78$; $p < 0.01$) and a significant inverse correlation between numbers of breeding pairs and disturbance ratios ($r = -0.57$; $p < 0.05$). It appears therefore that loons prefer to nest on lakes with many islands where there is a minimum of human disturbance.

DISCUSSION

Nests of loons in this study were all within four feet from the water while Olson and Marshall (1952) found nests ranging from none to five feet from

the water in Minnesota. The proximity of nests to the water edge may be related to the loon's crude locomotion on land. The nearness to water also allows loons a quick escape from man and mammalian predators.

The observation that the large majority of nests were found in a sheltered situation in this study and in Minnesota (41 of 54 nests; Olson and Marshall, 1952) may be related to protection of nests from wave action. That nests of loons are destroyed by waves was evident from a study done in contract for the author at Jan Lake, 54° 55′ N; 102° 55′ W, in Saskatchewan in 1972. Ten of a total of 25 nests were washed out there. The destruction seemed related to a combination of high water levels and waves produced by motor boats (Anweiler, pers. comm.).

Olson and Marshall (1952) reported that of 54 nests of loons located in Minnesota, 50 were on islands and only four on the mainland. The preference of loons for nesting on islands, observed in Minnesota and in this study, may be a mechanism against predation by land mammals.

In Alberta, California Gulls and Canada Geese (*Branta canadensis*) nesting on peninsulas and on islands separated from the mainland by very shallow water channels, have been observed to be subject to extensive predation by coyotes (Vermeer, 1970*a*; 1970*b*).

The mechanism which leads to loons selecting nesting sites on islands may be imprinting of young loons to island sites. Predation may be more extensive for loons nesting on the mainland than on islands. A lower hatching rate for loon clutches on the mainland will leave fewer young to be imprinted to those sites.

Similarly, extensive human disturbance may leave fewer or no young to return to breed on lakes where it takes place. Olson and Marshall (1952) reported that desertion caused the failure of ten nests of Common Loons and that six of those were traceable to human disturbance. Ream (1968) also found that increased use of island campsites by canoeists caused hatching failures of Common Loons in Minnesota. Lehtonen (1970) ascribed the decline of Arctic Loons (*Gavia arctica*) in southwestern Finland to increasing numbers of summer cottages and boating activities at lakes. From the above and from the author's observations it appears that loons are intolerant to human disturbance and for that reason they may serve as indicators of the wilderness quality of fishing lakes.

SUMMARY

A survey on breeding Common Loons was conducted on 19 eutrophic and fishing lakes in east-central Alberta. Loons were only observed on the fishing lakes. The large majority of loons nested on islands; in sheltered situations and within a few feet from the water. Although no correlation was found between the number of breeding pairs of loons and the size of a lake, there was a positive significant correlation between numbers of breeding

pairs and presence of lake islands. In addition there was a significant inverse correlation between number of breeding loons and the amount of human disturbance occurring at lakes. Inasmuch as loons are intolerant of human disturbance they may serve as indicators of the wilderness quality of fishing lakes.

ACKNOWLEDGMENTS

The author wishes to express his appreciation to K. Jaremco for his assistance during the study.

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